

## PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT


(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P2002J114	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/12884	International filing date (day/month/year) 18.11.2003	Priority date (day/month/year) 20.11.2002
International Patent Classification (IPC) or both national classification and IPC B01J37/02		
Applicant EXXONMOBIL RESEARCH AND ENGINEERING COMPANY		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 9 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  14.06.2004	Date of completion of this report  21.03.2005
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Zuurdeeg, B  Telephone No. +31 70 340-4467



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EXAMINATION REPORT**

International application No. **PCT/EP 03/12884**

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-67 as originally filed

**Claims, Numbers**

1-38 received on 03.02.2005 with letter of 31.01.2005

**Drawings, Sheets**

1/11-11/11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

**see separate sheet**

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. .

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-36
	No: Claims	37,38
Inventive step (IS)	Yes: Claims	1-36
	No: Claims	37,38
Industrial applicability (IA)	Yes: Claims	1-38
	No: Claims	

2. Citations and explanations

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see separate sheet

**Item IV**

**Lack of unity**

This Authority considers that there are 2 inventions covered by the claims indicated as follows:

- I: Claims 1-37 directed to a process for the manufacture of a catalyst and a process for the production of C5+ liquid hydrocarbons using the catalyst obtainable by the process
- II: Claim 38 directed to a process for removal of sulfur

The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

The application contains the following independent claims:

- activity/process claims (independent claim 1)
- activity/process claims (independent claim 37)
- activity/process claims (independent claim 38)

In the present case of claims belonging to the same category, only the catalyst may constitute a link. Therefore, the requirement of unity of invention is only satisfied under the precondition of the catalyst being novel and inventive.

On page 36, lines 25-29 of the current specification is indicated that under the reductant treatment any residual partially decomposed organic complex is removed. The catalyst obtainable by the process of claim 1 comprises a catalytically active metal dispersed on a support.

The material in common is already known from WO 98/47618 or D1 (see page 7, line 8 to page 8, line 13, examples 2-6, 9, 12, 16, 18-20, 35-45, 47, 49, 51, 54, 56) or US 3,761,428 or D2 (see examples 1-3), Aboul-Gheit or D5 (see table 1 and paragraph 2.6), US 4,073,750 or D6 (see table 1), US 4,431,574 or D7 (see table 1), HARTMANN M. *et al.* or D8 (see 2.1 Synthesis, table 3), US 4,634,515 or D10 (see examples) and US 6,118,037 or D11 (see examples).

With the catalyst in common being not novel, independent claims 37 and 38 relating to different processes using the catalysts are not so linked as to form a common general inventive concept.

Hence, the application contains multiple (groups) of inventions, as identified above, which are not unitary in the meaning of Rule 13.1 PCT.

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:
  - D1: WO 98/47618 A (EXXON RESEARCH ENGINEERING CO) 29 October 1998 (1998-10-29)
  - D2: US-A-3 761 428 (SUGIER ANDRÉ AND MIQUEL JEAN) 25 September 1973 (1973-09-25)
  - D3: US-A-2 889 287 (SCOTT JR JOHN W) 2 June 1959 (1959-06-02)
  - D4: PATENT ABSTRACTS OF JAPAN vol. 018, no. 525 (C-1257), 5 October 1994 (1994-10-05) - & JP 06 182208 A (IDEMITSU KOSAN CO LTD), 5 July 1994 (1994-07-05)
  - D5: ABOUL-GHEIT AHMED KADRY: "ROLE OF ADDITIVES IN THE IMPREGNATION OF PLATINUM AND RUTHENIUM ON ALUMINA CATALYSTS" JOURNAL OF CHEMICAL TECHNOLOGY AND BIOTECHNOLOGY, vol. 29, no. 8, August 1979 (1979-08), pages 480-486, XP008028876 OXFORD, GB
  - D6: US-A-4 073 750 (YATES DAVID J C ET AL) 14 February 1978 (1978-02-14)
  - D7: US-A-4 431 574 (VASUDEVAN STRINIVASAN ET AL) 14 February 1984 (1984-02-14)
  - D8: HARTMANN M ET AL: "Preparation and characterization of ruthenium clusters on mesoporous supports" MICROPOROUS AND MESOPOROUS MATERIALS, ELSEVIER SCIENCE PUBLISHING, NEW YORK, US, vol. 44-45, 6 April 2001 (2001-04-06), pages 385-394, XP004247170 ISSN: 1387-1811
  - D9: US-A-3 953 368 (SINFELT JOHN H) 27 April 1976 (1976-04-27)
  - D10: US-A-4 634 515 (SWAN GEORGE A ET AL) 6 January 1987 (1987-01-06)

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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D11: US-A-6 118 037 (SANFILIPPO DOMENICO ET AL) 12 September 2000 (2000-09-12)

2. The present application does not meet the requirements of Article 33(1) PCT, because the subject-matter of independent claims 37 and 38 is not new in the sense of Article 33(2) PCT in view of at least one of the documents D1 to D11.

2.1 None of the available prior art documents discloses the subject-matter of independent claim 1.

The subject-matter of independent claim 1 is therefore novel (Article 33(2) PCT).

2.2 Document D1 is regarded as the closest prior art.

The subject-matter of independent claim 1 differs from this known process for preparing catalysts in that the organic metal complex is partially decomposed, whereby the partially decomposed product (I) retains between 10 and 95% by weight attributed to the organic complex prior to partial decomposition and (II) exhibits one or more infrared adsorption bands between 2100-2200 cm<sup>-1</sup> that are not present in the organic complex before partial decomposition. In D1 the complex is fully decomposed.

When comparing example 7 (according to the invention) with example 8 (not according to the invention), it becomes apparent that the process of claim 1 achieves a combined dispersion of about 65%, whereas example 8 only achieves 7-8%.

The problem to be solved by the present invention may therefore be regarded as to provide a process for preparing catalysts with improved combined dispersion of the catalytically active metal (cfr. [008] to [010] and [036] of the current specification).

The available prior art documents do not give the skilled person a hint that, in order to solve the above identified problem, he should modify the process of D1 in the way as is defined in independent claim 1. The solution provided for in claim 1 is also not obvious in light of the prior art.

Therefore, an inventive step can be recognised for the subject-matter of independent claim 1 (Article 33(3) PCT).

- 2.3 Claims 2-36 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
- 2.4 Document D1 discloses the preparation of high activity catalysts, which involves the deposition of the catalytically active metal from a solution comprising a multi-functional carboxylic acid (amino acids; see examples and tables). The catalysts, comprising, e.g. cobalt, are used for the conversion of synthesis gas to waxy paraffinic C5+ hydrocarbons (see page 4, second paragraph to page 9, first paragraph). D1 attains the same advantages as in the current application, see page 24, last paragraph.

D6 discloses highly dispersed supported nickel catalysts which may be used for hydrocarbon synthesis, i.e. Fischer Tropsch reactions (claims 1-12, column 5, lines 55-58, examples 1-5).

The subject-matter of claim 37 is defined as a process using a catalyst which is defined by the process of its preparation. This claim defining the process using a catalyst in terms of a process is to be construed as a claim to the process using the catalyst as such. In principal, the applicant should show the novelty and inventive step of the product (produced according to claims 1-36) over products, which are being prepared by different processes, but have the comparable physical and chemical parameters (e.g. D1 and D6).

The subject-matter of independent claim 37 cannot be considered to be novel in view of D1 and D6.

- 2.5 Documents D10 (see claims 1-11, examples) and D11 (see claims 1-8, examples) disclose processes for the removal of sulfur with supported metal adsorbents.

The subject-matter of claim 38 is defined as a process using a material which is defined by the process of its preparation.



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There is currently no evidence on file that shows that the adsorbents prepared by the process of claims 1-36 are different from those disclosed in D10 and D11.

The subject-matter of independent claim 38 can therefore not be regarded novel over D10 and D11.

**Certain defects in the international application**

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D2-D6, D10 and D11 is not mentioned in the description, nor are these documents identified therein.

The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT.

The units "mesh", "psig", "inch", "°F", "atm" and "torr" employed on pages 12, 29, 40, 41, 53, 55, 56, 59 and 60 are not additionally expressed in terms of the units stipulated by Rule 10.1(a) PCT.

**Certain observations on the international application**

The embodiments of the invention described in examples 2, 3, 4, 8, 11-13, 22-24, 26-30 and 36-40 do not fall within the scope of the claims. This inconsistency between the claims and the description leads to doubt concerning the matter for which protection is sought, thereby rendering the claims unclear, Article 6 PCT.

Terms "the whole contents of which are hereby incorporated by reference" and the like used on pages 10-12 should be deleted upon entry in the regional phase.